

REMARKS

This amendment is in response to the Office Action of April 3, 2007 in which claims 1-21 were rejected.

In the Amendment submitted herein, various of the original claims are changed in ways believed related only to matters of form. For example, reference numerals/labels are removed from the claims, which change does not affect the scope of the claims per MPEP § 608.01(m) (the use of reference characters is considered as having no effect on the scope of the claims). The claims are amended to remove "step of" language. All introduced amendments do not change the scope of the amended claims.

In Section 3 of the Office Action, claims 1 and 4-21 were rejected under 35 U.S.C. 103(a) as being unpatentable over Lindoff et al. (US patent 6,842,476 B2) in view of Bottomley (US Patent 5,822,380) and further in view of Skold et al. (US Patent 5,933,768.)

Regarding independent claim 1, the Examiner's arguments are inaccurate and do not follow the MPEP guidelines. Therefore, the Examiner's interpretation of the references Lindoff et al., Bottomley and Skold et al. and their combination needs further clarification in order to distinguish the present invention from these references.

Paragraph 2143 states:

"To establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one

of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."

First in regard to claim 1 of the present invention, the Examiner stated that Lindoff et al. disclose a method for suppression of interfering co-channel signals, synchronous and asynchronous. The applicant disagrees, because Lindoff et al. does not disclose asynchronous suppression in the context of the scope of claim 1. The case depicted Figure 3a of Lindoff et al. is "almost" a synchronous mode of operation as stated on col. 4, lines 59-60 of Lindoff et al. Then Figure 3a corresponds to using a joint estimator unit 422 and a joint detection 424 as stated in col. 6, lines 26-31 of Lindoff et al., which is equivalent to using module 24 of the present invention as recited in claim 1 of the present invention. When Lindoff et al. have an asynchronous scenario corresponding to Figures 3b and 3c of Lindoff et al., the joint estimator unit 422 is not used, but instead Lindoff et al. use alternative schemes shown in Figure 4 of Lindoff et al.: an iterative detection scheme shown on the bottom of Figure 4 (see col. 6, lines 49-54) and a conventional scheme (see col. 7, lines 16-24) depicted on the top of Figure 4 and in Figure 1 of Lindoff et al.

Thus Lindoff et al. do not disclose asynchronous mode operation in the context of claim 1 of the present invention.

Second, in regard to claim 1 of the present invention, the Examiner alleged that Skold et al. disclose "an interfering training sequence signal and an interfering training sequence delay signal generated without prior knowledge of a training sequence of the interfering co-channel signals", as recited in claim 1 of the present invention". This is not accurate. Skold et al. only disclose the interfering training sequence signal (see ABSTRACT of Skold et al.) but not the interfering training sequence delay signal as recited in claim 1 of the present invention.

Third, in regard to claim 1 of the present invention, the Examiner alleged that Bottomley discloses "providing a desired bit decision signal" recited in claim 1 of the present invention. The applicant contends that this is quite inaccurate and problematic, because the desired bit decision signal of Bottomley is different than in the present invention since it ($b_{det}(n)$) is generated using inputs ($r_a(n)$ and $r_b(n)$) from two antennas (see Figure 3 Bottomley), whereas in the present invention it is generated using an input from one antenna since claim 1 of the present invention recites single antenna interference cancellation (also see Figure 1 of the present patent application).

Therefore, step of "computing a desired impulse response estimate signal by the joint channel estimator using the filtered waveform signal, the desired bit decision signal, and an interfering training sequence

signal and an interfering training sequence delay signal generated without prior knowledge of a training sequence of the interfering co-channel signals", as recited in claim 1 of the present invention, is not disclosed by any of the references Lindoff et al. contrary to what is alleged by the Examiner.

Thus, Lindoff et al., Bottomley and Skold et al. do not describe all limitations of the independent claim 1 of the present invention and fail to meet the third criterion of MPEP paragraph 2143 quoted above.

Even if only for the sake of argument we assume that Lindoff et al. in view of Bottomley and further in view of Skold et al. teach or suggest all the limitations of independent claim 1, it is further noted by the applicant that their combination is teaching away from the present invention recited in claim 1, teaching away from their own combination and/or destroying the intended functions of quoted references in many ways.

For example, incorporating Bottomley's provision for the desired bit decision signal (\hat{l}) into Lindoff et al. to perform "computing the desired impulse response estimate signal by the joint channel estimator using the filtered waveform signal, the desired bit decision signal,..." as recited in claim 1 of the present invention, is not going to work and will teach away from the embodiments of the present invention recited in claim 1, because Lindoff et al.'s joint channel estimator 422 (assuming for the sake of argument only that the module 422 is set up for asynchronous suppression as well, contrary to what is argued herein) is not configured for using the desired bit

decision signal ($\hat{a}(l)$) for estimating G and H (as stated in col. 5, lines 33-37 of Lindoff et al.). In other words, Lindoff et al. only uses the filtered waveform signal (received signal) and training sequence symbols for any signal manipulation (e.g., see Equation 4 of Lindoff et al.) and would not know what to do with the desired bit decision signal ($\hat{a}(l)$) presumably provided by Bottomley.

Similarly, incorporating Skold et al.'s provision for the interfering training sequence delay signal (again assuming for the sake of argument only that Skold et al. teach interfering training sequence delay signal) into Lindoff et al. to perform "computing a desired impulse response estimate signal by the joint channel estimator using the filtered waveform signal, the desired bit decision signal, and an interfering training sequence signal and an interfering training sequence delay signal generated without prior knowledge of a training sequence of the interfering co-channel signals," as recited in claim 1 of the present invention, is not going to function and will teach away from the embodiments of the invention recited in claim 1, because Lindoff et al.'s joint channel estimator 422 (assuming again for the sake of argument only that the module 422 is set up for asynchronous suppression as well, contrary to what is argued herein) is not configured for using the interfering training sequence delay signal for estimating G and H (as stated in col. 5, lines 33-37 of Lindoff et al.). In another words, Lindoff et al. only uses the filtered waveform signal (received signal) and training sequence symbols for any signal manipulation (e.g., see Equation 4 of Lindoff et al.) and would not know what to

do with the interfering training sequence delay signal presumably provided by Skold et al.

Furthermore, combining Bottomley with Lindoff et al. and Skold et al. is problematic because Bottomley discloses multiple antenna reception (at least two or more radio units each having corresponding antenna, see col. 4, lines 22-26 of Bottomley), whereas other references quoted by the Examiner disclose one antenna reception, as recited in claim 1 of the present invention. Thus, the combination of Lindoff et al., Bottomley and Skold et al. will both teach away from claim 1 of the present invention and destroy their intended functions (i.e., references are not combinable).

Furthermore, in regard to claim 1 of the present invention, the Office failed to demonstrate or provide any reasonable arguments in regard to "suggested desirability or motivation" or "reasonable expectation of success" for combining references by a person skilled in the art at the time of the invention without hindsight, as required by MPEP paragraph 2143 and an extensive case law on the subject

If again only for the sake of argument we assume that references Lindoff et al., Bottomley and Skold et al. teach or suggest all the limitations of independent claim 1 (contrary to what is proven above), there is no suggested desirability or motivation, expressed explicitly, implicitly or even hinted at by references Lindoff et al., Bottomley and Skold et al. or generally available to one of ordinary skill in the art to modify the reference of Lindoff et al. to arrive at the subject

matter of claim 1 of the present invention (as required by the MPEP Paragraph 2143 referenced above and by the case law) without the benefit of hindsight.

In regard to claim 1, the applicant is of the opinion that the reason stated by the Examiner in the Office Action, for example, for incorporating teaching of Bottomley in regard to the desired bit decision signal (â(1)) into Lindoff et al. in order "to generate channel tap coefficients estimates", as alleged by the Examiner, is irrelevant because it is presumed that what is done by Lindoff et al. anyway. Similarly, incorporating teaching of Skold et al. into Lindoff et al. in regard to generating "an interfering training sequence signal and an interfering training sequence delay signal generated without prior knowledge of a training sequence of the interfering co-channel signals" for the benefit of canceling the interfering signal from the received signal is further irrelevant because it is presumed again that what is done by Lindoff et al. anyway.

In other words, the Examiner's reasoning is practically similar to "shared advantage" approach such as achieving competitive advantage or economical advantage (which can make any invention obvious) irrelevant to the "problem to be solved" by the present invention, e.g., using a joint channel estimator with multistage detection approach for both synchronous and asynchronous SAIC suppression, which is novel and non-obvious, contrary to what is instructed by the MPEP procedure.

The Manual of Patent Examining Procedure (the MPEP) clearly refers to the "problem to be solved" approach and

cites a relatively recent Federal Circuit case supporting its use:

"The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). MPEP 2143.01.

Moreover, even if we assume again for the sake of argument only the reasons cited by the Examiner for combining the references of Lindoff et al., Bottomley and Skold et al. is relevant to claim 1 of the present invention, then the question is why Lindoff et al. (presumably a person or persons skilled in the art), who's patent was filed several years after issuance of the patents of Bottomley and Skold et al. did not use the corresponding teachings of Bottomley and Skold et al. to incorporate them to arrive at the subject matter of claim 1 of the present invention, contrary to what is alleged by the Examiner?

Furthermore, in regard to motivation to combine references, The Federal Circuit Court has several times further expressly addressed the issue.

For example, in *re Geiger, supra*, it is stated, in holding that the USPTO "failed to establish a *prima facie* case of obviousness":

"Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)."

Furthermore, Judge Newman, in her opinion in *In re Lee*, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1433 (Fed Cir. 2002), repeats this fundamental principle:

"When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness."

The Examiner failed to show *prima facie* case of obviousness because he does not show any basis even remotely present in the art at the time of the invention for combining or modifying references (see MPEP paragraphs 2142, 2143 quoted above, and the case law), as shown above. Therefore, it is highly unlikely that somebody of ordinary skill in the art would have been reasonably expected to combine references quoted by the Examiner at the time of the invention and to find the solution claimed by the Applicant without the benefit of hindsight (again assuming for sake of argument only that Lindoff et al., Bottomley and Skold et al., when

combined, teach or suggest all the limitations of independent claim 1).

Moreover, the Office Action of April 3, 2007 does not show that Lindoff et al., Bottomley and Skold et al. provide teaching or suggestion for the reasonable expectation of success by modifying the reference of Lindoff et al. in view of Bottomley and further in view of Skold et al. to find the solution claimed by the Applicant in claim 1, as required by the MPEP paragraph 2143, quoted above to establish a *prima facie* case of obviousness.

Thus, based on all above arguments, claim 1 is not obvious under 35 U.S.C. 103(a) as being unpatentable over Lindoff et al. in view of Bottomley and further in view of Skold et al.

Claim 13 is independent claims, which is similar in scope to claim 1 of the present invention. Therefore, above arguments regarding novelty and non-obviousness of independent claim 1 are fully applied to claim 13 of the present invention. Therefore, claim 13 is not obvious under 35 U.S.C. 103(a) as being unpatentable over Lindoff et al. in view of Bottomley and further in view of Skold et al. as well.

Regarding claims 4-12 and 14-21, these are dependent claims of independent claims 1 and 13. Independent amended claims 1 and 13 are not unpatentable over Lindoff et al. in view of Bottomley and further in view of Skold et al. as shown above. Since each of the dependent claims 4-12 and 14-21 narrows the scope of the corresponding novel and non-

obvious independent claim 1 and 13, non-obviousness of claims 1 and 13 will compel non-obviousness of claims 4-12 and 14-21.

More arguments in regard to specific limitations recited in dependent claims to obviate their obviousness, alleged by the Examiner, can be made.

For example, in regard to claim 4, Lindoff et al. do not disclose asynchronous suppression in the context of the present invention as argued above in regard to claim 1.

In regard to claim 6 of the present invention, the applicant is of opinion that referring to col. 2, lines 4-35 of Bottomley by the Examiner has nothing to do with the fact that "the desired bit decision signal partly comprises a known training bit sequence signal", as recited in claim 6. The applicant requests the Office to provide explanation and a concrete proof.

In regard to claim 7 (the same is applied to claim 14) of the present invention, the Bottomley shows only one stage receiver in Fig. 3 (which is not a single antenna receiver anyway), wherein claim 7 recites "first stage" presuming a "second stage", etc., which is not disclosed by Bottomley or any other reference quoted by the Office.

In regard to claim 8 (the same is applied to claim 15), none of the references quoted by the Examiner explicitly talk about iterative constant modulus (CM) channel estimator especially for describing the first stage of the SAIC receiver (none of the quoted references disclose more than one stage anyway) recited in claim 8 of the present invention.

In regard to claim 9 (the same is applied to claim 16) none of the references quoted by the Examiner disclose "a

further SAIC detector of a second stage" as recited in claim 9. Bottomley's element 28 has only one detector 25 (which is not single antenna detector anyway) thus "further SAIC detector" is not disclosed by Bottomley.

In regard to claim 10-12 (the same is applied to claim 18, 19, 21) none of the references quoted by the Examiner disclose elements of the recited 2nd and 3d stages: Bottomley's element 28 has only one detector 25 and apparently one stage only.

More detailed arguments in regard to additional limitations of claims 4-12 and 14-21 and their combining can be presented if requested by the Office and if more explanations are provided by the Office.

In Section 4, claims 2-3 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindoff et al. (US Patent 6,842,476 B2), Bottomley (US Patent 5,822,380) and Skold et al (US Patent 5,933,768) and further in view of Suzuki et al (US Patent 6,088,383.)

Regarding claims 2-3 and 20, these are dependent claims of independent claims 1 and 13. Independent amended claims 1 and 13 are not unpatentable over Lindoff et al. in view of Bottomley and further in view of Skold et al. as shown above. Since each of the dependent claims 2-3 and 20 narrows the scope of the corresponding novel and non-obvious independent claim 1 and 13, non-obviousness of claims 1 and 13 will compel non-obviousness of claims 2-3 and 20.

More arguments in regard to specific limitations recited in dependent claims to obviate their obviousness, alleged by the Examiner, can be made.

For example in regard to claims 2, 3 and 20 of the present invention, the Examiner does not show why a person skilled in the art would combine Suzuki et al. with other 3 references quoted by the Examiner, i.e., why a replica signal is needed. MPEP section 2142 states:

"The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant in under no obligation to submit evidence of non-obviousness." Therefore the applicant requests the withdrawal of the obviousness rejection until such a proof is presented by the Office.

The objections and rejections of the Office Action of April 3, 2007 having been obviated by amendment or shown to be inapplicable, withdrawal thereof is requested and passage of claims 1-21 to issue is solicited.

Respectfully submitted,



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